

## Cardiac symptoms and association with anxiety among Riyadh population

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### ABSTRACT

Currently, Cardiac neurosis (Cardiophobia) is a common issue, which is often misdiagnosed as a heart attack. It exhibits signs and symptoms which are similar to heart disease. This excessive stress may lead to the occurrence of clinical disease like hypertension, heart disease and seizures. The purpose of this study is to investigate the relationship between cardiac symptoms and its association with psychological symptoms of anxiety disorders. A total of 1568, who experience new cardiac symptoms in Riyadh were surveyed from September 2020 until November 2020 using a combination of three self-reported valid questionnaire. Cardiac symptoms and anxiety were more prevalent among females and advance age. It was also widespread among individuals who had a sedative lifestyle. It was found that cardiac anxiety score was high among those who seek investigations for the diagnosis of cardiac diseases frequently. It was also noticed that there is a strong positive correlation between psychological disorders (depression and agoraphobia) and cardiac anxiety. Cardiac neurosis is a common medical problem in our society. Coronary risk factors must be well assessed in patient with cardiac symptoms.

**Keywords:** Cardiac neurosis, Anxiety, Heart attack

### 1. INTRODUCTION

A wave of dread overcomes, chest hurts, heart flutters, and they cannot catch their breath. These classic anxiety symptoms are often mistaken for a heart attack. Emotional turmoil triggers the release of stress hormones, which act on the same brain areas that regulate cardiovascular functions such as heart rate and blood pressure (Harvard Health Publishing, 2019). On the other hand, we cannot deny that anxiety helps us stay alert and conscious, but only to a particular level, and it can be completely exhausting for those with an anxiety disorder. Anxiety is the sense of discomfort, distress, or dread you feel before a significant event. It is defined as the reaction of the mind and body to stressful, dangerous, or unfamiliar situations (Jovanovic et al., n.d). There are many anxiety-related disorders, and they are divided into three main categories: Anxiety disorders, Obsessive-compulsive and related disorders.



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There are many types under the umbrella of those categories, for example: excessive, uncontrollable worry over events and activities and potential negative outcomes is called Generalized Anxiety Disorder (GAD) which causes significant distress or interfere with the individual's daily life, occupational, academic, or social functioning to meet diagnosis, and these symptoms cannot be better accounted for by another mental disorder or be caused by substances, medications, or medical illness. Symptoms in general could include: dizziness, tiredness, strong, fast or significantly irregular heartbeat (palpitation), muscle-ache, trembling, dry-mouth, shortness of breath, chest-pain, headache, stomachache, hyper-sweating, cold-Intolerance (Jovanovic et al., n.d).

Moreover, Heart Anxiety Neurosis (Cardiac neurosis or Cardiophobia), is one of the anxiety disorders in which patients experience heart sting, palpitations, shortness of breath which are the same symptoms of a heart disease. Therefore, the ones who are affected start to believe that they suffer from a heart disease or a heart attack. But the fact is, what causes the problems is fear of getting a heart disease and not the patient's heart itself. 5% of the population suffers from functional cardiovascular disorders, according to experts. Most people who suffer are males between 18-40 years old. Cardiac neurosis symptoms include; long-term discomfort and the same feeling of a heart disease. The more people pay attention to it, the more they experience threatening and frightening emotions (Berthel, 2014).

There is mounting evidence for independent anxiety-heart disease link. In particular, people who have generalized anxiety disorder seem to suffer higher rates of heart attack and other cardiac events such as tingling or burning sensation in the heart area, as well as pressure and tightness in the chest. There are several theories about how constant anxiety of this type may affect the cardiovascular system. Anxiety can change the body's stress response, the combination of hormonal and physiological reactions that helps all animals fight or flee from a real threat. People with anxiety disorders have inappropriate ups and downs that can cause high blood-pressure, and heart rhythm disturbances (Harvard Health Publishing, 2019). The fear or worry they experience about their heart health could lead to seizures and can lead to panic-attacks with shortness of breath and hyperventilation, profuse sweating, dizziness and feelings of powerlessness. Some patients experience actual "heart-attacks" with fear of dying (Berthel, 2014). Nevertheless, a heart attack according to National health service-UK is a serious medical emergency in which the supply of blood to the heart is suddenly blocked, usually by a blood clot (National health service-UK, 2019).

The coronary arteries that keep the blood flow in the heart muscle may tighten by a buildup of fats, cholesterol and other substances that together are called Plaque. Atherosclerosis is what this slow process known as, Ischemia occurs when the heart muscle needs oxygen and nutrients. It is known as a Heart Attack or Myocardial Infarction (MI) when part of the heart muscle is damaged or dies from ischemia (American Heart Association, 2016). Physical symptoms which are similar with anxiety symptoms may also occur in heart attack including: chest pain – a sensation of pressure, tightness or squeezing in the center of the chest, pain in other parts of the body – it can feel as if the pain is travelling from the chest to the arms (usually the left arm is affected, but it can affect both arms), jaw, neck, back and tummy (abdomen), feeling lightheaded or dizzy, sweating, shortness of breath, feeling sick (nausea) or being sick (vomiting), an overwhelming sense of anxiety (similar to having a panic attack), coughing or wheezing (National health service-UK, 2019).

According to a survey conducted in China found that the most severe symptoms of anxiety patients are cardiovascular, followed by fatigue and muscle soreness, and it also indicates that few cardiologists have been able to recognize cardiac neurosis, and patients with cardiac neurosis have frequent symptoms, they usually have a very large number of hospital visits, and an increase in long-term CHD incidence has been observed in these patients who have suffered from cardiac neurosis, and the study recommends the necessity of providing psychotherapy and psychological care along with routine cardiovascular treatment and care (Zheng et al., 2019). Another survey to assess psychological distress and healthcare use in patients with non-cardiac chest pain that has been done in Sweden with Non-Cardiac chest discomfort patients reveals that depressive symptoms have a strong direct effect on both Somatization and Cardiac anxiety. Also, the relationship between Cardiac anxiety and Fear of body sensations reveals equivalent change as that found for the relationship between Fear of body sensations and Somatization, higher levels of Somatization were associated with higher levels of Fear of body sensations, and higher levels in Fear of body sensations were in turn associated with higher levels of Cardiac anxiety in patients with history of Cardiac Diseases, Moreover, it is important to have a new innovative interventions targeting this patient group, Cognitive behavioral therapy has been found workable in this patient group (Mourad et al., 2018).

A surveyed study of anxiety symptoms in heart patients in the Palestinian population indicates that heart patients need strict treatment for depression and anxiety. An evidence points to a negative impact on the course of heart disease, Cardiac rehabilitation can be an active starting point for fixing mental health problems outside the patient and into the extended family and social network (Allabadi et al., 2019). Finally, a study was conducted at the University of Virginia to assess cardiac anxiety in people with and without coronary atherosclerosis. Its results showed that the first group who had major coronary atherosclerosis showed less awareness of heart-related symptoms and less anxiety about these symptoms than people who did not have coronary

atherosclerosis. On the other hand, both groups were not significantly different on reassurance-seeking and avoidance of activities. The result of this study suggests that cognitive behavioral therapy CBT for people with heart-related concerns may be useful to re-evaluate their beliefs about these symptoms (Marker et al., 2008).

This study will evaluate the link between heart symptoms and anxiety disorder among Riyadh residents, and explore the relationship between heart symptoms and mental health. The main objective is to provide a basis for health workers to realize that there are more effective psychological interventions to stabilize the patient's mood and raise the level of rehabilitation.

## 2. SUBJECTS AND METHODS

We conducted a correlational study design by applying a Cardiac Anxiety questionnaire which targeted all individuals who live in Riyadh and were posted online (Eifert et al., 2000). The timeline to collect the questions was two months; from September 2020 until November 2020. The questions evaluated the anxiety level for the individual and correlate it with Cardiac symptoms and we will take into consideration the other variables such as age, life style and Chronic disease. The survey was self-reported and the questions were directed to smooth the survey and avoided any blank or false answers. The target population of the study will be all individuals living in Riyadh, Saudi Arabia. Our sample size was 1568 participants and we excluded 333 participants. Our confidence rate is 95% with 5% margin error based on Riyadh population which is 7,677,000 according to the General Authority for statistics. Individuals who were included in the research are 18-75 years old who live in Riyadh from both genders; Locals and foreigners who experience Cardiac symptoms such as Palpitation. We will exclude individuals under the age of 18 or over the age of 75 or those who did not have Cardiac symptoms. The survey was posted and shared on different social media platforms to cover the multi-group population who have different education levels and backgrounds.

Data, which was collected from the questionnaire from individuals who previously agreed to participate in this study and the information provided, was used for research purposes only, and data was treated with strict confidentiality according to the rules established by the National Committee of Bio and Medical Ethics (NCBE) operating within the framework of King Abdulaziz City for Science & Technology (KACST). Collected information was organized, tabulated, and the data analysis was performed using the Statistical Package for Social Sciences, SPSS 23rd version. Frequency and percentages were used to display categorical variables, while mean and standard deviation were used to display continuous variables. Independent t-test and ANOVA test were used to test correlation. ANOVA test was followed by Tukey posthoc test to determine where the significance difference existed between subgroup. Pearson correlation was also utilized to check the presence of significant correlation between continuous variables. Level of significance was set at 0.05.

### Measurement

**Cardiac Anxiety Questionnaire (CAQ):** The CAQ is a Likert scale self-reported questionnaire consisting of 18 items found to measure Cardiac focused anxiety, the rating scale of 5 points starting from (0) which means never to (4) which means always. Key Factor Analysis extracts 3 subscales: Fear [8 items]; Avoidance [5 items]; Attention [5 items] (Mourad et al., 2008). There was a cross validating study in the Netherlands reporting good internal consistency for both key factors and subscales (Cronbach  $\alpha$  0.84) and (Cronbach  $\alpha$  between 0.6-0.9) respectively (VanBeek et al., 2012).

In addition, we used Agoraphobic Cognitions Questionnaire (ACQ) which is a self-reported questionnaire with 14 items Likert scales from (1) to (5) which are thought never occur for (1), thought always occurs for (5). The ACQ test can differentiate people with anxiety disorders and those without them with high internal consistency (Cronbach  $\alpha$  = 0.87) (Caputo et al., 1984).

Also, Patient Health Questionnaire (PHQ) which is a self-reported version of PRIME-MD diagnostic tool for common mental disorders, its depression measurement meets 9 DSM-IV criteria as "0" (not at all) to "3" (nearly every day). It's a valid measure of depression severity and is useful for clinical diagnosis and for research purposes (Kroenke et al., 2001). We used a translated version from the Saudi Ministry of Health. Finally, for the cardiovascular assessment in sociodemographic section, we collected information regarding cardiovascular risk factors, cardiac history, and comorbidity, and hospital admission was extracted by taking the health-history from the volunteers by electronic forms with a double check by a consultant cardiologist.

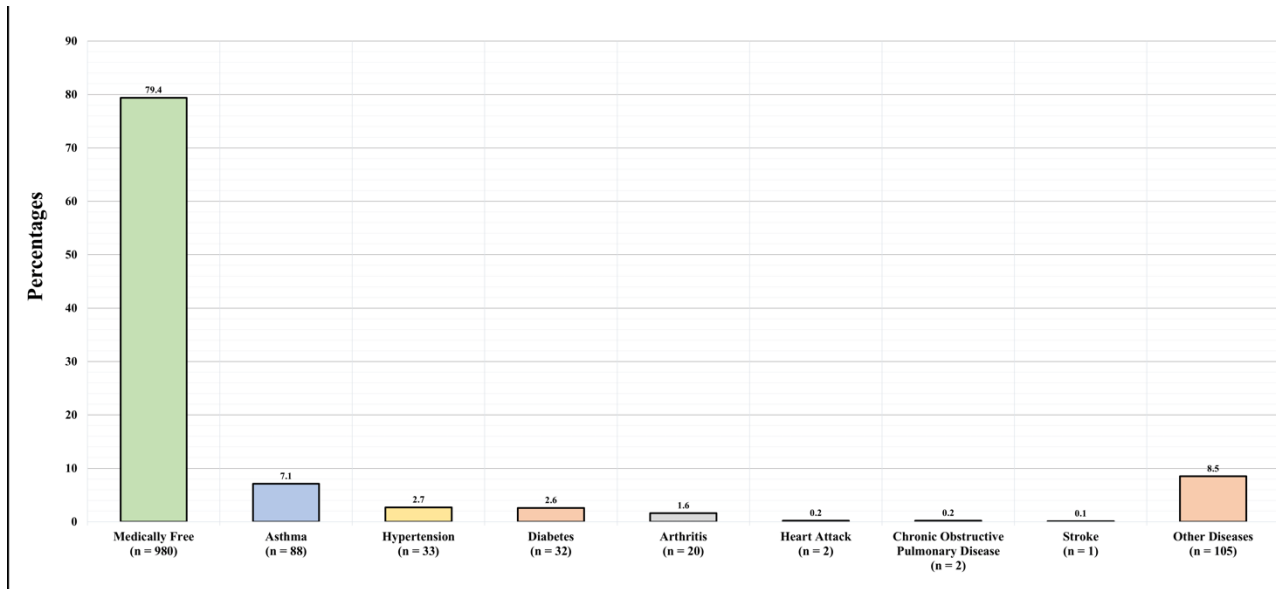
## 3. RESULTS

A total of 1568 participated in the study, 333 of them were excluded from the study, and 174 were excluded for being less than 18 years old, 3 were excluded for being older than 75 years old, 63 were excluded for being on psychiatric medication, 60 for not having any cardiac anxiety symptom and 33 for having incomplete responses. A total of 1235 were enrolled in the analysis. Table 1 shows the socio-demographic profile of the participants.

| <b>Table 1</b> Socio-Demographic Profile of The Participants (n =1235) |     |       |
|--|-----|-------|
| Demographical Characteristics  | n   | %     |
| Gender   |     |       |
| Male   | 667 | 54    |
| Female   | 568 | 46    |
| Age  |     |       |
| 18 - 30 years  | 975 | 78.90 |
| 31 - 40 years  | 183 | 14.80 |
| 41 - 50 years  | 57  | 4.60  |
| 51 - 60 years  | 20  | 1.60  |
| Education  |     |       |
| Primary School an Less   | 2   | 0.20  |
| Intermediate and High School Level                                     | 359 | 29.10 |
| Bachelor and Diploma   | 822 | 66.60 |
| Master and PhD   | 52  | 4.20  |
| Marital Status   |     |       |
| Single   | 920 | 74.50 |
| Married  | 280 | 22.70 |
| Divorced   | 32  | 2.60  |
| Widowed  | 3   | 0.20  |
| Place of Residency   |     |       |
| Northern Riyadh  | 405 | 32.80 |
| Eastern Riyadh   | 404 | 32.70 |
| Western Riyadh   | 153 | 12.40 |
| Southern Riyadh  | 141 | 11.40 |
| Central Riyadh   | 132 | 10.7  |
| Are you currently working?   |     |       |
| Yes  | 447 | 36.20 |
| No   | 788 | 63.80 |
| Are you a smoker?  |     |       |
| Yes  | 277 | 22.40 |
| No   | 958 | 77.60 |
| Do you exercise?   |     |       |
| Never  | 468 | 37.90 |
| 1 - 2 times a week   | 456 | 36.90 |
| 3 - 4 times a week   | 161 | 13.00 |
| 5 - 6 times a week   | 78  | 6.30  |
| Everyday   | 72  | 5.8   |

667 (54%) were males and 568 (46%) were females. As for the age distribution, 975 (78.9%) were between 18 - 30 years old, 183 (14.8%) were between 31 – 40 years old, 57 (4.6%) were between 41 – 50 years old, 20 (1.6%) were between 51 – 60 years old. As for the education level of participants, 2 (0.2%) had a primary school education or less, 359 (29.1%) had an intermediate / high school

education, 822 (66.6%) had bachelor / diploma, and 52 (4.2%) had masters / PhD. As for the marital status, 920 (74.5%) were single, 280 (22.7%) were married, 32 (2.6%) were divorced, and 3 (0.2%) were widowed. As for the place of residency, 405 (32.8%) were from Northern Riyadh, 404 (32.7%) were from the Eastern Riyadh, 153 (12.4%) were from Western Riyadh, 141 (11.4%) were from Southern Riyadh, and 132 (10.7%) were from the central region. 447 (36.2%) of the participants were working, and 277 (22.4%) were smoking. As for exercising, 468 (37.9%) don't exercise, 456 (36.9%) were exercising 1 – 2 times a week, 161 (13%) were exercising 3 – 4 times a week, 78 (6.3%) were exercising 5 – 6 times a week, 72 (5.8%) were exercising every day. Figure 1 displays the medical history of participants. 980 (79.4%) were medically free. 88 (7.1%) had asthma, 33 (2.7%) had hypertension, 32 (2.6%) had diabetes, 20 (1.6%) had arthritis, 2 (0.2%) had heart attack, 2 (0.2%) chronic obstructive pulmonary disease, 1 (0.1%) had stroke, 105 (8.5%) had other diseases. Table 2 demonstrates the heart disease status of the participants.



**Figure 1** medical history of participants

| Table 2 Heart Diseases Status in Participants (n = 1235)   |      |       |
|--|------|-------|
| Question   | n    | %     |
| Q1/Have you ever been diagnosed with heart disease?  |      |       |
| Yes  | 61   | 4.9   |
| No   | 1174 | 95.1  |
| Q2/ How many times have you gone through investigation for heart disease and was revealed to be normal |      |       |
| Never  | 882  | 71.40 |
| 1 - 2 times  | 279  | 22.60 |
| 3 - 4 times  | 40   | 3.20  |
| 5 times and more   | 34   | 2.80  |

61 (4.9%) were previously diagnosed with heart disease, and 1174 (95.1%) were not. When asked how many times have the participants gone through investigation for heart disease and was revealed to be normal, 882 (71.4%) stated never, 279 (22.6%) stated 1 – 2 times, 40 (3.2%) stated 3 – 4 times, and 34 (2.8%) stated 5 times and more. Table 3 shows the participants responses toward cardiac anxiety questionnaire. Table 4 displays the participant's responses toward depression assessment (PHQ-9) questionnaire.

| <b>Table 3</b> Cardiac Anxiety Questionnaire (n = 1235) |     |       |
|---|-----|-------|
| Question  | n   | %     |
| Q1/ I pay attention to my heartbeat                     |     |       |
| Never   | 247 | 20.00 |
| Rarely  | 315 | 25.50 |
| Sometimes   | 395 | 32.00 |
| Often   | 174 | 14.10 |
| Always  | 104 | 8.40  |
| Q2/ I avoid physical exertion                           |     |       |
| Never   | 278 | 22.50 |
| Rarely  | 322 | 26.10 |
| Sometimes   | 412 | 33.40 |
| Often   | 180 | 14.60 |
| Always  | 43  | 3.50  |
| Q3/ My racing heart wakes me up at night                |     |       |
| Never   | 856 | 69.3  |
| Rarely  | 200 | 16.2  |
| Sometimes   | 120 | 9.7   |
| Often   | 45  | 3.6   |
| Always  | 14  | 1.1   |
| Q4/ Chest pain/discomfort wakes me up at night          |     |       |
| Never   | 827 | 67.00 |
| Rarely  | 203 | 16.40 |
| Sometimes   | 143 | 11.60 |
| Often   | 46  | 3.70  |
| Always  | 16  | 1.30  |
| Q5/ I take it easy as much as possible                  |     |       |
| Never   | 191 | 15.50 |
| Rarely  | 201 | 16.30 |
| Sometimes   | 388 | 31.40 |
| Often   | 290 | 23.50 |
| Always  | 165 | 13.40 |
| Q6/ I check my pulse                                    |     |       |
| Never   | 444 | 36.00 |
| Rarely  | 339 | 27.40 |
| Sometimes   | 262 | 21.20 |
| Often   | 123 | 10.00 |
| Always  | 67  | 5.40  |
| Q7/ I avoid exercise or other physical work             |     |       |
| Never   | 512 | 41.50 |
| Rarely  | 272 | 22.00 |
| Sometimes   | 275 | 22.30 |
| Often   | 117 | 9.50  |
| Always  | 59  | 4.80  |
| Q8/ I can feel my heart in my chest                     |     |       |
| Never   | 348 | 28.20 |
| Rarely  | 283 | 22.90 |
| Sometimes   | 321 | 26.00 |
| Often   | 185 | 15.00 |

|   |     |       |
|---|-----|-------|
| Always  | 98  | 7.90  |
| Q9/ I avoid activities that make my heartbeat faster                          |     |       |
| Never   | 549 | 44.50 |
| Rarely  | 252 | 20.40 |
| Sometimes   | 263 | 21.30 |
| Often   | 115 | 9.30  |
| Always  | 56  | 4.50  |
| Q10/ If tests come out normal, I still worry about my heart                   |     |       |
| Never   | 754 | 61.10 |
| Rarely  | 191 | 15.50 |
| Sometimes   | 126 | 10.20 |
| Often   | 103 | 8.30  |
| Always  | 61  | 4.90  |
| Q11/ I feel safe being around a hospital, physician or other medical facility |     |       |
| Never   | 579 | 46.90 |
| Rarely  | 182 | 14.70 |
| Sometimes   | 179 | 14.50 |
| Often   | 141 | 11.40 |
| Always  | 154 | 12.50 |
| Q12/ I avoid activities that make me sweat                                    |     |       |
| Never   | 662 | 53.60 |
| Rarely  | 210 | 17.00 |
| Sometimes   | 210 | 17.00 |
| Often   | 79  | 6.40  |
| Always  | 74  | 6.00  |
| Q13/ I worry that doctors do not believe my symptoms are real                 |     |       |
| Never   | 662 | 53.60 |
| Rarely  | 204 | 16.50 |
| Sometimes   | 195 | 15.80 |
| Often   | 96  | 7.80  |
| Always  | 78  | 6.30  |
| Q14/ I worry that I may have a heart attack                                   |     |       |
| Never   | 525 | 42.50 |
| Rarely  | 274 | 22.20 |
| Sometimes   | 279 | 22.60 |
| Often   | 107 | 8.66  |
| Always  | 50  | 4.04  |
| Q15/ I have difficulty concentrating on anything else                         |     |       |
| Never   | 410 | 33.20 |
| Rarely  | 313 | 25.30 |
| Sometimes   | 300 | 24.30 |
| Often   | 111 | 9     |
| Always  | 101 | 8.2   |
| Q16/ I get frightened   |     |       |
| Never   | 400 | 32.4  |



|   |     |       |
|---|-----|-------|
| Rarely                                    | 300 | 24.3  |
| Sometimes                                 | 315 | 25.5  |
| Often                                     | 130 | 10.52 |
| Always                                    | 90  | 7.28  |
| Q17/ I like to be checked out by a doctor |     |       |
| Never                                     | 352 | 28.50 |
| Rarely                                    | 257 | 20.80 |
| Sometimes                                 | 299 | 24.20 |
| Often                                     | 200 | 16.2  |
| Always                                    | 127 | 10.3  |
| Q18/ I tell my family or friends          |     |       |
| Never                                     | 459 | 37.20 |
| Rarely                                    | 326 | 26.40 |
| Sometimes                                 | 230 | 18.60 |
| Often                                     | 124 | 7.80  |
| Always                                    | 96  | 10    |

| Table 4 Depression Assessment (PHQ-9) (n = 1235)   |     |       |
|--|-----|-------|
| Question   | n   | %     |
| Q1/ Little interest or pleasure in doing things?   |     |       |
| Not at all   | 347 | 28.10 |
| Several Days   | 530 | 42.90 |
| More than half of the days   | 209 | 16.90 |
| Nearly everyday  | 149 | 12.10 |
| Q2/ Feeling down, depressed, or hopeless?  |     |       |
| Not at all   | 222 | 18.00 |
| Several Days   | 561 | 45.40 |
| More than half of the days   | 269 | 21.80 |
| Nearly everyday  | 183 | 14.80 |
| Q3/ Trouble falling or staying asleep, or sleeping too much?   |     |       |
| Not at all   | 253 | 20.50 |
| Several Days   | 396 | 32.10 |
| More than half of the days   | 268 | 21.70 |
| Nearly everyday  | 318 | 25.70 |
| Q4/ Feeling tired or having little energy?   |     |       |
| Not at all   | 208 | 16.80 |
| Several Days   | 521 | 42.20 |
| More than half of the days   | 264 | 21.40 |
| Nearly everyday  | 242 | 19.60 |
| Q5/ Poor appetite or overeating?   |     |       |
| Not at all   | 327 | 26.50 |
| Several Days   | 417 | 33.80 |
| More than half of the days   | 259 | 21.00 |
| Nearly everyday  | 232 | 18.80 |
| Q6/ Feeling bad about yourself - or that you are a failure or have let yourself or your family down? |     |       |
| Not at all   | 391 | 31.70 |
| Several Days   | 399 | 32.30 |
| More than half of the days   | 225 | 18.20 |



|  |     |       |
|--|-----|-------|
| Nearly everyday  | 220 | 17.80 |
| Q7/ Trouble concentrating on things, such as reading the newspaper or watching television?   |     |       |
| Not at all   | 554 | 44.90 |
| Several Days   | 364 | 29.50 |
| More than half of the days   | 165 | 13.40 |
| Nearly everyday  | 152 | 12.30 |
| Q8/ Moving or speaking so slowly that other people could have noticed?<br>Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual? |     |       |
| Not at all   | 867 | 70.20 |
| Several Days   | 232 | 18.80 |
| More than half of the days   | 76  | 6.20  |
| Nearly everyday  | 60  | 4.90  |
| Q9/ Thoughts that you would be better off dead, or of hurting yourself in some way?  |     |       |
| Not at all   | 979 | 79.30 |
| Several Days   | 136 | 11.00 |
| More than half of the days   | 62  | 5.00  |
| Nearly everyday  | 58  | 4.70  |

Table 5 demonstrates the participant's responses toward agoraphobia questionnaire. Table 6 shows the assessment results of cardiac anxiety, depression, and agoraphobia questionnaire. Figure 2 illustrates the depression assessment based on the (PHQ-9) classification.

| Table 5 Agoraphobia Questionnaire (n = 1235) |      |       |
|--|------|-------|
| Question                                     | n    | %     |
| Q1/ I am going to throw up                   |      |       |
| Never  | 780  | 63.20 |
| Rarely                                       | 227  | 18.40 |
| Half of the times                            | 156  | 12.60 |
| Usually                                      | 47   | 3.80  |
| Always                                       | 25   | 2.00  |
| Q2/ I am going to pass out                   |      |       |
| Never  | 718  | 58.10 |
| Rarely                                       | 257  | 20.80 |
| Half of the times                            | 179  | 14.50 |
| Usually                                      | 63   | 5.10  |
| Always                                       | 18   | 1.50  |
| Q3/ I must have a brain tumor                |      |       |
| Never  | 1014 | 82.10 |
| Rarely                                       | 119  | 9.60  |
| Half of the times                            | 72   | 5.80  |
| Usually                                      | 19   | 1.50  |
| Always                                       | 11   | 0.90  |
| Q4/ I will have a heart attack               |      |       |
| Never  | 839  | 67.90 |
| Rarely                                       | 220  | 17.80 |

|  |      |       |
|--|------|-------|
| Half of the times                        | 105  | 8.50  |
| Usually                                  | 43   | 3.50  |
| Always                                   | 28   | 2.30  |
| Q5/ I will choke to death                |      |       |
| Never                                    | 968  | 78.40 |
| Rarely                                   | 137  | 11.10 |
| Half of the times                        | 84   | 6.80  |
| Usually                                  | 29   | 2.30  |
| Always                                   | 17   | 1.40  |
| Q6/ I am going to act foolish            |      |       |
| Never                                    | 684  | 55.40 |
| Rarely                                   | 233  | 18.90 |
| Half of the times                        | 180  | 14.60 |
| Usually                                  | 88   | 7.10  |
| Always                                   | 50   | 4.00  |
| Q7/ I am going blind                     |      |       |
| Never                                    | 1048 | 84.90 |
| Rarely                                   | 111  | 9.00  |
| Half of the times                        | 52   | 4.20  |
| Usually                                  | 19   | 1.50  |
| Always                                   | 5    | 0.40  |
| Q8/ I will not be able to control myself |      |       |
| Never                                    | 677  | 54.80 |
| Rarely                                   | 278  | 22.50 |
| Half of the times                        | 156  | 12.60 |
| Usually                                  | 76   | 6.20  |
| Always                                   | 48   | 3.90  |
| Q9/ I will hurt someone                  |      |       |
| Never                                    | 945  | 76.50 |
| Rarely                                   | 149  | 12.10 |
| Half of the times                        | 92   | 7.40  |
| Usually                                  | 34   | 2.80  |
| Always                                   | 15   | 1.20  |
| Q10/ I am going to have a stroke         |      |       |
| Never                                    | 1028 | 83.20 |
| Rarely                                   | 106  | 8.60  |
| Half of the times                        | 69   | 5.60  |
| Usually                                  | 18   | 1.50  |
| Always                                   | 14   | 1.10  |
| Q11/ I am going crazy                    |      |       |
| Never                                    | 931  | 75.40 |
| Rarely                                   | 152  | 12.30 |
| Half of the times                        | 86   | 7.00  |
| Usually                                  | 38   | 3.10  |
| Always                                   | 28   | 2.30  |
| Q12/ I am going to scream                |      |       |
| Never                                    | 716  | 58.00 |
| Rarely                                   | 233  | 18.90 |
| Half of the times                        | 131  | 10.60 |

|   |      |       |
|---|------|-------|
| Usually                                 | 72   | 5.80  |
| Always                                  | 83   | 6.70  |
| Q13/ I am going to babble or talk funny |      |       |
| Never                                   | 696  | 56.40 |
| Rarely                                  | 238  | 19.30 |
| Half of the times                       | 169  | 13.70 |
| Usually                                 | 79   | 6.40  |
| Always                                  | 53   | 4.30  |
| Q14/I am going to be paralyzed by fear  |      |       |
| Never                                   | 1088 | 88.10 |
| Rarely                                  | 98   | 7.90  |
| Half of the times                       | 34   | 2.80  |
| Usually                                 | 6    | 0.50  |
| Always                                  | 9    | 0.70  |

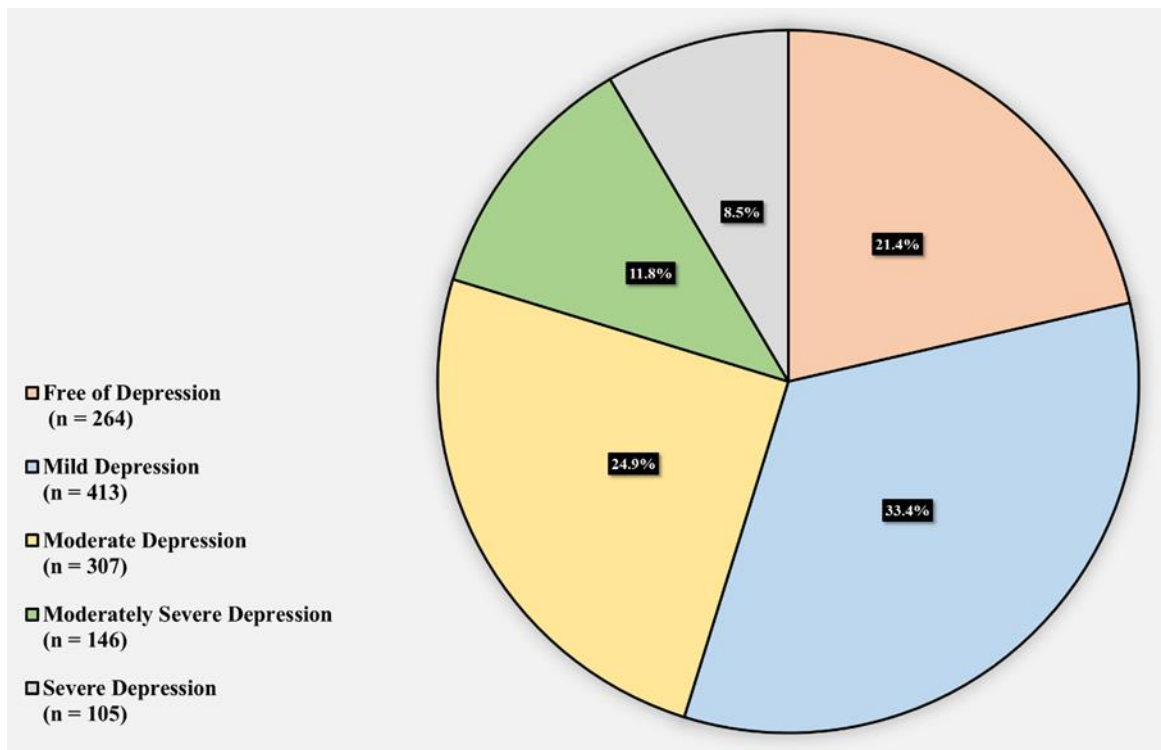


Figure 2 depression assessment

Table 6 Assessment of Cardiac Anxiety, Depression, Agorophobia (n = 1235)

| Cardiac Anxiety Score |       |
|-----------------------|-------|
| Minimum               | 1     |
| Maximum               | 59    |
| Mean                  | 21.44 |
| Standard Deviation    | 10.57 |
| Depression Score      |       |
| Minimum               | 0     |
| Maximum               | 27    |
| Mean                  | 9.71  |

|                    |       |
|--------------------|-------|
| Standard Deviation | 6.22  |
| Agorophobia Score  |       |
| Minimum            | 14    |
| Maximum            | 61    |
| Mean               | 21.45 |
| Standard Deviation | 7.85  |

264 (21.4%) were free of depression, 413 (33.4%) had mild depression, 307 (24.9%) had moderate depression, 146 (11.8%) had moderately severe depression, and 105 (8.5%) had severe depression. Table 7 displays the factors associated with cardiac anxiety score.

| <b>Table 7</b> Factors Associated with The Cardiac Anxiety Score |                       |                    |           |
|--|-----------------------|--------------------|-----------|
| Factor   | Cardiac Anxiety Score |                    | P-Value   |
|  | Mean                  | Standard Deviation |           |
| Gender   |                       |                    | < 0.001 * |
| Male   | 19.99                 | 10.49              |           |
| Female   | 23.14                 | 10.42              |           |
| Age  |                       |                    | 0.038*    |
| 18 - 30 years  | 21.02                 | 10.61              |           |
| 31 - 40 years  | 22.65                 | 10.45              |           |
| 41 - 50 years  | 23.39                 | 9.64               |           |
| 51 - 60 years  | 25.2                  | 10.77              |           |
| Education  |                       |                    | 0.090     |
| Primary School an Less   | 32.5                  | 9.19               |           |
| Intermediate and High School Level                               | 20.45                 | 10.64              |           |
| Bachelor and Diploma   | 21.84                 | 10.58              |           |
| Master and PhD   | 21.46                 | 9.57               |           |
| Marital Status   |                       |                    | 0.01*     |
| Single   | 20.96                 | 10.59              |           |
| Married  | 22.6                  | 10.42              |           |
| Divorced   | 23.84                 | 10.15              |           |
| Widowed  | 34.33                 | 4.16               |           |
| Place of Residency   |                       |                    | 0.159     |
| Northern Riyadh  | 20.58                 | 10.34              |           |
| Eastern Riyadh   | 21.4                  | 10.13              |           |
| Western Riyadh   | 21.78                 | 11.29              |           |
| Southern Riyadh  | 22.07                 | 10.60              |           |
| Central Riyadh   | 23.1                  | 11.551             |           |
| Are you currently working?                                       |                       |                    | 0.791     |
| Yes  | 21.54                 | 10.47              |           |
| No   | 21.38                 | 10.63              |           |
| Are you a smoker?  |                       |                    | 0.226     |
| Yes  | 20.76                 | 10.31              |           |
| No   | 21.63                 | 10.64              |           |
| Do you exercise?   |                       |                    | < 0.001*  |
| Never  | 22.99                 | 11.274             |           |
| 1 - 2 times a week   | 21.59                 | 10.262             |           |

|  |          |       |          |
|--|----------|-------|----------|
| 3 - 4 times a week   | 19.99    | 8.68  |          |
| 5 - 6 times a week   | 17.85    | 9.72  |          |
| Everyday   | 17.49    | 10.38 |          |
| Co-Morbidities   |          |       |          |
| Medically Free   | 20.55    | 10.07 | < 0.001* |
| Not Medically Free   | 24.83    | 11.72 |          |
| Asthma   | 25.35    | 8.62  | 0.095    |
| Don't have Asthma  | 21.37    | 10.59 |          |
| Hypertension   | 27.85    | 10.55 | < 0.001* |
| Don't have Hypertension  | 21.26    | 10.52 |          |
| Diabetes   | 25.91    | 11.76 | 0.015*   |
| Don't have Diabetes  | 21.32    | 10.52 |          |
| Chronic Obstructive Pulmonary Disease\   | 34.5     | 0.71  | 0.080    |
| Don't have chronic Obstructive Pulmonary Disease\  | 21.41    | 10.57 |          |
| Heart Attack   | 34       | 11.31 | 0.093    |
| Don't have Heart Attack  | 21.42    | 10.56 |          |
| Other Diseases   | 26.95    | 11.88 | < 0.001* |
| Don't have Other Diseases  | 20.92    | 10.30 |          |
| Have you ever been diagnosed with heart disease?   |          |       | < 0.001* |
| Yes  | 27.36    | 12.27 |          |
| No   | 21.13    | 10.39 |          |
| How many times have you gone through investigation for heart disease and was revealed to be normal |          |       | < 0.001* |
| Never  | 19.77    | 9.90  |          |
| 1 - 2 times  | 25.08    | 10.46 |          |
| 3 - 4 times  | 25.95    | 12.93 |          |
| 5 times and more   | 29.41    | 12.81 |          |
| Depression Assessment  |          |       | < 0.001* |
| None   | 16.28    | 9.54  |          |
| Mild   | 19.99    | 9.27  |          |
| Moderate   | 23.75    | 10.14 |          |
| Moderately Severe  | 25.37    | 10.40 |          |
| Severe   | 27.87    | 12.13 |          |
| Correlation with Agorophoba Score  |          |       |          |
| Pearson's Correlation  | 0.447    |       |          |
| P-Value  | < 0.001* |       |          |
| * Significant at level 0.05  |          |       |          |

A difference was found between males and females in the mean score of cardiac anxiety ( $p < 0.001$ ), whereas higher mean of cardiac anxiety was found in females compared to males (23.14 + 10.42 vs 19.99 + 10.49). A difference was also observed between different age groups ( $p = 0.038$ ), whereas the older the age group the higher the mean of cardiac anxiety score, however Tukey post-hoc test revealed no remarkable difference between any 2 groups. A difference in the mean of cardiac anxiety was also observed between marital status ( $p = 0.01$ ), however Tukey post-hoc test revealed no remarkable difference between any 2 groups. A difference was also present in the mean of cardiac anxiety score across the different pattern of exercise among the participants ( $p <$

0.001), whereas the higher the number of exercise sessions the less mean score of cardiac anxiety. Tukey post-hoc test revealed a significant difference between those who never exercise and those who exercise 3 – 4 times a week, those who exercise 5 – 6 times a week and those who exercise everyday ( $p < 0.05$ ). It also revealed a remarkable difference between those who exercise 1 – 2 times a week and those exercising 5 – 6 times a week and those exercising everyday ( $p < 0.05$ ). As for the co-morbidities, a difference was present between those who are medically free and those who were not ( $p < 0.001$ ), whereas higher mean of cardiac anxiety was found in those who are not medically free. A difference was present between those who had hypertension and those who did not ( $p < 0.001$ ), whereas higher mean of cardiac anxiety was found in those who had hypertension. A difference was present between those who had diabetes and those who did not ( $p = 0.015$ ), whereas higher mean of cardiac anxiety was found in those who had diabetes. A difference was present between those who had other diseases and those who did not ( $p < 0.001$ ), whereas higher mean of cardiac anxiety was found in those who had other diseases. A significant difference was present between those who were previously diagnosed with heart diseases compared to those who were not ( $p < 0.001$ ), whereas higher mean of cardiac anxiety was found in those who had cardiac disease. A difference was noticed between those went through investigations for the diagnosis of cardiac diseases ( $p < 0.001$ ), whereas the higher the frequency of going through the investigation of the higher mean of cardiac anxiety score was. Tukey post-hoc test revealed a remarkable difference between those who never went through investigations and those who went 1 – 2 times, those who went 3 – 4 times, and those who went 5 times and more. A remarkable relationship between depression and cardiac anxiety ( $p < 0.001$ ), whereas the higher the level of depression the higher the mean score of cardiac anxiety. Tukey post-hoc test revealed a difference in the mean score of cardiac anxiety between those who do not have depression and all levels of anxiety ( $p < 0.05$ ), a difference was also present between those with mild depression and all levels of depression were higher than mild ( $p < 0.05$ ), a difference was found between those with moderate depression and those with severe depression ( $p < 0.05$ ) and a significant difference was found between those with moderately severe depression and those with severe depression ( $p > 0.05$ ). A remarkable correlation was seen between cardiac anxiety score and agoraphobia score ( $p < 0.001$ ), Pearson's correlation was 0.447.

#### 4. DISCUSSION

In this study, we found that females had a significant correlation with cardiac anxiety compared to males, and this becomes more significant with older age. Moreover, the relationship status appears to have a role with cardiac anxiety especially in widows followed by divorced individuals. In our research, the majority of the participants were disease free (980) and had a lower degree of anxiety compared to participants with chronic diseases, and similar results were found in other studies (VanBeek et al., 2012; VanBeek et al., 2014). From the above, we recognize that the majority of the participants are considered disease free, and patients with chronic diseases are 20.6% of the total participants, and the chronic diseases that these patients suffer from are miscellaneous, the majority of them suffer from asthma, as they constitute more than a third of the total number of people with Chronic diseases in general, followed by people with hypertension, however, those with hypertensive had a greater association with cardiac anxiety than any other chronic disease. We can say that the previous results are logical and expected, for those who are disease free will naturally have less anxiety than those who suffer from chronic diseases, and so will people with hypertension.

In our research, 32 participants were diabetic and when compared to non-diabetic individuals, we found that diabetics have a higher mean of cardiac anxiety, and on the other hand, researchers in other studies did not find a significant association between diabetes and cardiac anxiety (VanBeek et al., 2012; VanBeek et al., 2014). There were 62 individuals who participated in our research and were diagnosed with heart disease and had higher average scores on cardiac anxiety compared to individuals with no cardiac disease. However, in another study, researchers found that participants without heart disease had a higher rate of cardiac anxiety scores compared to participants with heart disease (Marker et al., 2008). In regard to the correlation between psychological disorders (depression and agoraphobia) and cardiac anxiety, our study showed significant correlation between cardiac anxiety and psychological disorders. These findings are consistent with previous studies (Mourad et al., 2016; vanBeek et al., 2014). Our study revealed that the more exercise sessions, the less cardiac anxiety. A systemic review in patients with myocardial infarction found that exercise has positive impact on reducing anxiety symptoms (Eifert et al., 2000).

#### 5. CONCLUSION

As a conclusion, Cardiac neurosis is a common medical problem in our society. Coronary risk factors must be well assessed in patient with cardiac symptoms. Exclusion cardiac neurosis must be diagnosed after assessing the patient condition. Re-assurance and good communication skills are essential.

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**Authors' contributions**

OA conceived the presented idea. A.O and F.S wrote the abstract. O.A wrote the introduction. A.A was responsible of the questionnaire writing and validating. M.R and A.A wrote the methodology and did the data analysis and contributed to the interpretation of the results. M.S helped supervise the project. All authors contributed in writing the discussion and provided critical feedback and helped shaped the research.

**Conflict of Interest**

The authors declare that there are no conflicts of interests.

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**Ethical approval**

The study was approved by the Research Ethics Committee of Al-Imam Muhammad ibn Saud University (ethical approval number: 65-2020).

**Data and materials availability**

All data associated with this study are present in the paper.

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